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tebral axis; *fff*, its dorsal and ventral membranous lobes, which include numerous horny and partly osseous supporting fibres. From Günther.

PLATE XVII.—Fig. 1, *Salmo fario*, adult, caudal skeleton; *b* and *bi*, basilar cartilages; *ep*, epural, and *hy*, hypural elements; *m*, lateral membrane bone, which has had an epural cartilaginous element as its nucleus; *in*, intercalary cartilage; *u*, urostyle; *op*, opisthure. After Lotz. Fig 2, *Salmo salar*, adult, caudal skeleton; lettering as in Fig. 1. From Lotz. Fig. 3, *Barbus fluviatilis*, adult, caudal skeleton; lettering as before. From Lotz.

PLATE XVIII.—Fig. 1, *Cottus gobio*, adult, caudal skeleton; lettering as in Plate XVI. From Lotz. Fig. 2, *Perca fluviatilis*, adult, caudal skeleton; lettering as before. From Lotz. Fig. 3, *Echiodon dentatus*, adult, gephyrocercal caudal extremity; *c*, centra; *ep* and *hy*, hypural processes; *b*, basilar cartilages: *i*, interspinous cartilages; *h*, hiatus between dorsal rays (*rd*) and postanal rays (*rv*); x 17. From Emery. Fig. 4, *Fierasfer acus*, gephyrocercal caudal extremity; *ep*, epural processes; *c c c*, centra not in contact; *ch ch ch*, membranous or cartilaginous central intervals; *uch*, exserted end of chorda, or urochord; *h*, hiatus between last dorsal rays (*rd*) and last postanal rays (*rv*); x 55. From Emery.

A ZOÖLOGICAL RECONNOISSANCE IN GRAND MANAN.

BY J. WALTER FEWKES.

ON the side towards Eastport, Grand Manan presents a series of lofty cliffs rising abruptly out of the sea, so precipitously that it would be almost impossible to climb from the shore to their summits. Only in a few places is this rampart broken through, leaving sheltered coves where boats can find anchorage. Ordinarily the lofty cliffs rise abruptly from the sea, and the few stretches of beach crowded in between the foot of the cliff and the water are exceptional, and limited in extent. Deep into this lofty buttress of rock there extends at one point on this side of the island a deep fiord, known as Dark Harbor, so-called because in former times its heights were covered with sombre trees. The sides of these hills have been denuded by forest fires of their ancient woody covering. This fiord, however, is a harbor only in name, and while it may have been formerly a bay, there now stretches across its entrance a low beach formed of cobblestones, effectually shutting out its deeper waters from the sea outside. It still has communication with the Bay of Fundy by means of a small artificial channel through which the waters rise and fall twice every day, the still lagoon feeling the influence of the giant tides, for which this region is remarkable. Around the base of the lofty cliffs sweep the strong and swift currents which the great tides create. Sometimes this moving water is irresistible, carrying everything along with it as it sets back and forth under the brow of the high land which forms the dike or backbone of the island.

Under these lofty cliffs the fisherman spreads his net or casts his lines, and the Passamaquoddy Indian still as of old hunts the porpoise from his frail canoe, and on the scanty beaches at the base of the cliffs he tries out the oil. His picturesque but not over-clean huts, perched on the side hills, and a few houses at Dark Harbor, are the only habitations of man on this side of the island, save the isolated light-house and the home of the light-keeper.

But there is another shore of Grand Manan which is very different from that we have mentioned. The coast on this side is less rugged and more inviting as a landing-place, and on this shore there are many harbors protected by out-lying islands, in which fishing craft ride at anchor. Here the land slopes more gradually to the water's edge, and the coast is indented by frequent bays and coves.[1] Through the channels which separate the islands from the shore line currents similar to those on the other side of the island make their way with great power, and the ebb-tides cause the water to retreat so far that the coves are often left bare by the retreating water. But here the coast is more hospitable, and more like the adjacent shores of New England.

[1] Among many geological evidences of erosion on this shore, not the least interesting are the examples of "pot-holes," or "giant's kettles," found between Seal Cove and Grand Harbor, not far from the main road. The well-marked prismatic and columnar structure of the dike which forms the lofty cliff is well shown at Southern Head, near the light-house.

Upon this shore most of the homes of the inhabitants of Grand Manan are situated, for here are clustered the small villages of fishermen's houses, scattered in hamlets here and there at intervals from one end to the other of the island. Along this shore wharves are frequent, and several small villages lie nestled near the water's edge, on well protected bays.

At a point about midway from one end of the island to the other there is a group of houses called Woodward's Cove. The main road from North Head, where the steamer lands, to the opposite extremity of the island, skirts the shore, leaving only the landing places, upon which are situated a few houses for smoking herring, between it and the water. The place is a picturesque one, and interesting in many ways, but perhaps more especially to me, since around it cluster pleasant recollections of a summer's vacation passed on Grand Manan, in the study of the rich marine life of the island.

Just opposite Woodward's Cove lies an island called Nantucket. Why so named, or whether the story of its southern namesake is here repeated, I have never been able to discover. It is but one of the numerous islands which rise here and there from the shallow platform between the main island and the deep water of the Bay of Fundy.

My first visit to Nantucket was during a thick fog. Alighting with baggage from the carriage which carries passengers and mail from one end of the island to the other, I found myself in Woodward's Cove in the midst of a thick fog. So dense was the fog, in fact, that I was obliged to trust the statement of the boatman that Nantucket existed at all. No land was visible as we pushed off from the shore and headed our boat in a direction in which the island was known to lie, and we had to trust our boatman, and patiently wait until we reached the other side of the channel before we were at all sure of its existence. The certainty with which the fishermen of Grand Manan can find their way in the thickest fog is marvelous. Thoroughly trained in navigation in these waters, every incident, every sound, guides their course when sight fails; the direction of the wind the set of the tide, the ripple of the water on the rocks or beach, the gun from the distant Gannet Rock, all contribute to a keen sense of direction by which these men find their way to their fishing grounds and back in a thick fog, when one not skilled in this knowledge would lose his way, or, bewildered, would lay his course to the distant shore of Nova Scotia, or the broad open entrance to the Bay of Fundy.

Nantucket is known far and wide among naturalists as the home of Mr. Simeon Cheney. This gentleman was well called by Professor Baird a "natural naturalist." He is an acute observer of nature, a good collector, a tireless worker, and one whose interest in natural history age but increases, and whose energy in his old age many younger naturalists have good cause to remember. It was my purpose to spend a few weeks with him on Nantucket studying the sea animals of this interesting locality.[2] My visit was not unrewarded, and I have good reason to congratulate myself that the choice of this island was made. I was accompanied and aided in my work by an enthusiastic student of natural history, Mr. J. G. Owens, of Bridgeton, New Jersey.

On coasts where the tides are high, and other conditions favorable, the collecting of the marine life which is characteristic of the shore, is, as a rule, very profitable. Similar conditions to those which are found at Nantucket exist along the coast of the English Channel, and in Brittany on the coast of France. The same tidal characteristics are found about Eastport, and at other places in Maine. Grand Manan offers many advantages for the study of marine animals, while the outlying islands, reefs, and ledges left bare by the retreating tide present unparalleled resources for collecting the varied life of the north-eastern coast. As time goes by and as naturalists turn their steps more and more frequently to the shores to investigate the marine life, these islands will be more and more visited, and it is to be hoped that they will acquire an ever-increasing reputation for the many advantages which they possess for the study of these animals in their native haunts.[3] If it may be permitted me to speak with enthusiasm I may say that marine zoölogists have hardly begun to appreciate the wealth of life round about this island, which lies comparatively speaking at our very doors, and simply awaits an investigation.

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[2] I can recommend Nantucket as better than any place on the coast of New England for "show collecting."

The opportunities for work at Grand Manan with the dip-net in the study of free-swimming animals are also very great. The student of these forms of life is particularly recommended to visit the so-called "Ripplings" or tide eddies, several miles from the shore, near the line where the platform of the islands sinks to the deeper sounding of the Bay of Fundy. These eddies are favorite feeding places of many marine animals, from the whale to the minute Medusæ and Crustacea, and at a proper time of the tide afford most profitable collecting places. The distance from the shore and the difficulty of access is the only drawback, but if possible they should be visited by every naturalist who is interested in the study of marine life in its natural habitat. A world for investigation here awaits the attention of the naturalist.

Of those who have visited Grand Manan, and left valuable publications adding greatly to our knowledge of the marine life of the place, prominent among all should be mentioned the name of Dr. William Stimpson. Many others have worked here, but as the group of animals which it was my purpose to study had been more particularly considered by him I mention his name with especial indebtedness. I went to Grand Manan to study the lower Invertebrata, and my studies of this group found in this locality were greatly aided by his previous studies. It does not detract from my appreciation of the value of the works of others that I have singled out his work as of greater use to me, and his paper is recommended as one of many valuable companions for those who would visit this island for a purpose similar to my own.

My object in spending a vacation on Nantucket was to study the Cœlenterata and Echinodermata, more especially the changes in form which certain members of these groups pass through in their development. There are certainly many remarkable genera of these animals found nearer home, of the young of which little is known, but I aspired to trace the changes in the external form of the body of the young of those of which we know next to nothing, since many of these animals are more numerous at Grand Manan than elsewhere on our coast. The study of the Echinoderms, and the desire to trace the development of certain genera, are subjects which have interested me for several years, and these studies can be pursued with great advantage on the shore of Grand Manan. No locality on the coast is more prolific in Echinoderm life than this, and here occur animals the problems connected with which rank among the more interesting of those presented to the consideration of the morphologist.

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[3] Grand Manan had last summer a tri-weekly communication with Eastport by the mall steamer *Flushing*. Eastport can be reached from Boston by the steamers of the International Line, also called the St. John's steamers. The trip to Eastport by rail from Boston to Calais, and then by steamer down the St. Croix river, gives the visitor much scenic beauty.

Looking, for instance, from the embryological standpoint, we have of starfish the genus Hippasterias, of the young of which nothing is known. Pteraster, also found in these waters, carries its young in pouches on the back or aboral side of the body. It presents interesting problems of the nature and significance of direct development. Among these animals, with the exception of a pair of figures of a single stage of the young, nothing is known of the embryology of this marvelous genus. Then there is Ctenodiscus, whose young have a strange projection on the middle of the dorsal region of the body, reminding one of the stem of a Crinoid. Of the young of Solaster and Crossaster we know nothing. Moreover, the affinities of the latter with Brisinga, which has likenesses itself to the Ophiurans, are such that a study of its young promises interesting morphological results.

Although many points which I hoped to investigate I was unable to make out, my visit was not wholly without valuable results.

My search for the Comatula described by Stimpson from Grand Manan was without success. Familiar with the places which this animal loves on other coasts, I looked in similar localities along the shore, among the laminarians on the Fucus, everywhere, but always with disappointment. I gave it up at last, and concluded that the specimen which he found was a straggler from some congenial home. Not that I hoped to discover anything new in relation to the development of the young of this animal, for the changes which it passes through are well known, but it would have been a pleasure to be the second person to detect here this rare animal, if its home is really in the waters of Grand Manan. That pleasure would have been enhanced by the fact that since the time when this little creature was found by Stimpson in these waters genera and species of this animal have been described, and it would have been a satisfaction to know whether or not his specimen belongs to some species twice made known, for until this animal is once more found and compared either with types or with descriptions we must remain in doubt what it is or to what species it is allied.

We also searched in vain for the "basket-fish," *Gorgonocephalus agassizii.* Fresh from dredging excursions in the channel between Eastport and Campobello, where, as under the brow of the "Friar," many of these Echinoderms are brought up in the dredge, it was a surprise that this interesting creature was not found in our work. Distant trips to remote dredging grounds failed to reward us. A trip to the side of the island under the lofty cliffs near the Indian encampment, where it is said to exist in numbers, was without result. But always, like a phantasmagoria, the stories of the fishermen led us on. There is no doubt that the "basket-fish" is to be found there, but where it occurs we were not fortunate enough to discover. An account of the metamorphosis which it passes through between the egg and adult would be a substantial contribution to our knowledge of Echinoderm development.

But the rewards which came to us in collecting Ophiurans more than made up for our want of success in regard to Comatula and Gorgonocephalus. Nowhere have I seen a richer harvest of the genera Ophiopholis, Amphiura, Ophioglypha, and Ophiacantha. A favorite collecting place for the first of these is on the shore opposite Mr. Cheney's house. On the point left bare by the retreating tide hardly a single stone could be raised without disturbing an Ophiuran hidden under its cover. These animals have a variety of colors, with markings of many patterns, but all belong to the same species, *Ophiopholis aculeata.* In the channel off the Weirs between High Duck Island and Nantucket we dredged bushels of these animals so crowded together that the dredge bay was simply gorged with them. A motley crowd they were, too, as we emptied the dredge in the bottom of the boat. My friend and fellow-student, to whom this was the first introduction to these animals, was beside himself with joy, but subsequent repetition of these hauls renders even the most enthusiastic less anxious to secure specimens, and we came to wish that something else from the sea bottom might have a chance.

Amphiura squamata was not found as abundant as *O. aculeata.* We picked them up among the small stones, sometimes in the coralline zone, but never as abundant as the Ophiopholis. The characteristic Ophiocoma and Ophiacantha were dredged more sparingly, but they may be said to occur in numbers off High Duck Island and Nantucket. We never collected these genera on the shore between tides in places where Ophiopholis and Amphiura love so much to dwell.

All of the many genera of starfishes which live in the waters of Grand Manan were found in our several dredging excursions.

Among the most interesting of the Asteroidea are the beautiful species of Hippasterias, two of which were dredged off Long Island in comparatively shallow water. Crossaster was taken in the channel between Long Island and High Duck, while Solaster was found at various points near low water mark. The latter was often taken with the boat hook, and in collecting could sometimes be readily seen from the boat when the water was quiet.

Innumerable specimens of three species of Asterias, some of which are of giant size, occur in the passage ways between the islands, and were readily found and preserved. [4] Crebrella, which is very common at Grand Manan, is found in all conditions of growth. A colony composed of fifty or more, each resembling a bright red spot on the rock, was taken by my friend Mr. Owens. The young of Crebrella when the arms begin to push out from a pentagonal disk do not differ from those of Asterias, but as the arms develop it was found that there was no prominent row of dorsals, and that the plates were irregularly scattered over the back.

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[4] Our method of successful preservation of these Echinoderms was to place them first in fresh water until the rays were extended and the body inflated, then, plunging them into boiling hot water, they were allowed to remain there for from three to five minutes. They were then baked in an oven or over the stove, never, however, allowing them to become over-heated. It was best to cut out the hepatic cœca of the genus Hippasterias by an incision in the angle of the arm before baking, otherwise the body of the starfish is blackened by the exuding matter from this organ.

The number of individuals of the Echinoidea at Grand Manan is very great, but the variety is small. Echinarachnius and Strongylocentrotus are the most common. The former were often found in such abundance as to clog our dredge, and on the points of land at low tide we gathered many on the shore. White specimens of Strongylocentrotus were found which resemble in every respect the green colored. The boring habits of this genera I have already mentioned in a former number of the NATURALIST.

The gaint among the Holothurians, *Pentacta frondosa,* is very common at Grand Manan, where it is known as the "sea pudding." Cuvieria is rare, but its bright red body may often be detected as the animal clings by its suckers to the rocks at the line of low tide. This Holothurian is sometimes called the "sea orange" or "sea lemon." The very young Cuvieria were found clinging to the rocks by two terminal suckers, in which are embedded scales composed of an open calcareous lattice-work. Scales or perforated plates are also found in the tentacles, which are but little branched. In the younger stages the color of Cuvieria reminds one of a young Actinian.

The summer of 1889 at Grand Manan was exceptional in the variety of animals from southern waters which were collected. Among these were *Physalia arethusa,* and the well-known Anatifer which is often so common in Narragansett Bay. A floating half cocoanut, covered with the ordinary "Goose Barnacle," was picked in the bay near Gannet Rock. The long voyage which this fragment had taken in the waters of the Gulf Stream need not surprise one; but the fact that it was found in the cold waters of the Bay of Fundy is an unusual one. All the hydroids mentioned by Stimpson, with the exception of Grammaria, were collected by us. In place of this problematical genus a beautiful

Antennularia, which closely resembles Grammaria, which has never been found in the Bay of Fundy, was taken on several excursions. Halecium, a hydroid not described by Stimpson, but not unknown from Grand Manan, is one of the most common of the hydroids observed, while Eudendrium, Tubularia, Corymorpha, Clava, Campanularia, and various genera of Plumularidæ and Sertularidæ are very abundant. There is no subject which would yield better results in the study of our marine animals than that of the hydroids of the waters about Grand Manan. Very little research on these animals from the Bay of Fundy has yet been carried on.

A genus allied to Myriothela also occurs at Grand Manan. The genus called Acaulis was discovered at Grand Manan, and described by Stimpson, who failed, however, to recognize its affinities with Myriothela. The true relation of the genus Acaulis has been for many years[5] problematical with me, and I have been led to regard it as the broken head of a Tubularian, following the opinion of several well-known naturalists in this identification. A study of the living specimens of Myriothela, and an examination of the unpublished figures of the Eastport representative, made over ten years ago by Professor Hyatt, and loaned to me for study, leads me to place Acaulis in the neighborhood of Myriothela, retaining Stimpson's name for it until a new examination can be made to determine its true systematic position. Stimpson's description is quoted below verbatim, in order that what is at present known of this animal may preface a few conclusions of my own, drawn from an examination of Prof. Hyatt's drawings.

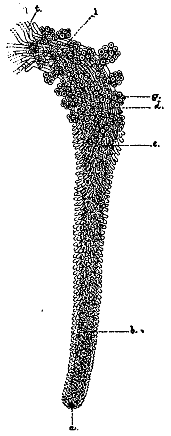

FIG. 2. — Acaulis. (A. Hyatt, del).

Stimpson's account of Acaulis ["Invertebrata of Grand Manan"] is as follows:

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[5] My examination of specimens of Myriothela found at Roscoff, France, convinced me that Acaulis is a close ally of this interesting genus. On several visits to Eastport and Grand Manan I have repeatedly looked for both Myriothela and Acaulis, but have never been able to find either.

"ACAULIS, St. n. g.

A. primarius, St. n. s., Fig. 4. The remarkable polyp for which this name is proposed, which is probably the largest hydroid known,[6] was observed at Grand Manan in two successive stages of development. It was first taken early in August, when it was of a sub-cylindrical form, tapering suddenly to a point at each extremity. At the upper extremity was the mouth, very small, a little below which the tentacula commenced, scattered at first, but gradually increasing in number, and somewhat in size. These tentacula were minute, very short, equaling in length about one-sixth the thickness of the body, with large globular tips. They occupied about two thirds of the body; on the remainder below, their places were supplied by the medusa buds, which were crowded, and much larger than the tentacula although as yet but little developed. The inferior extremity of the body terminated in a short, pointed, fleshy spike, free from appendages, from which exuded a tenacious mucus, by which it adhered to the subaqueous surfaces to which it might be applied. Around the base of this spike, and immediately under the buds, were regularly arranged eight long gracefully-curved cirriform processes, each equaling in length about half that of the body. These appeared from their motions to be in this—the first stage of the animal's existence—the locomotive organs.

"At a subsequent time I met with several of these animals which presented a different appearance. The tentacula were larger, especially in the region of the mouth, at the now blunt extremity of the body; and the medusa buds were in an advanced state of development, soon to become free-swimming individuals. The inferior appendages had disappeared, and the body was firmly attached by a broad base, and bore much resemblance to one of the ordinary Corynidæ deprived of its stalk. In strong contractions it assumed a shape approaching an hour-glass. The length of the animal in this latter stage was half an inch, the breadth two-tenths. In the earlier stage the dimensions were one-half these.

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[6] The giants added to the Hydroidea of the deep sea by the explorations of late years were unknown when this was written by Stimpson.

"It was dredged in the laminarian, from 5 to 15 feet, attached to various Rhodosperms, as Ptilota, Chondrus and Rhodymenia. Circumstances did not permit me to ascertain the medusoid form of this polyp, although I have my conjecture."

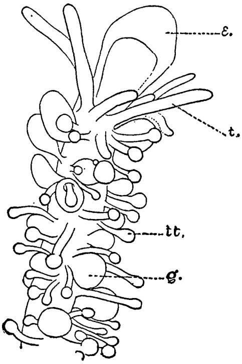

FIG. 3.—View of anterior end of Acaulis, showing temporary tentacles *tt* (A. Hyatt, del.)

Prof. Hyatt's sketches[7] represent two stages of development in the life history of this remarkable hydroid. One of these [Fig. 3] is evidently of a younger and less developed animal, possessing temporary tentacles which have a likeness to those figured by Allman in the immature Myriothela. We know from Allman that as the Myriothela grows older, the tentacles, which in this genus are known to belong to larval life, disappear, and are lost in the adult. These are represented in our figure [Fig. 3] on the axis, about one-third the length of the young Acaulis, while the remainder of the body bears simply suckers, which cover the surface of this region of its body. In the second figure [Figs. 1 and 2], which represents a larger individual, and one which is therefore probably more mature, two regions can be readily distinguished in the body, which we may call an anterior and a posterior body-region. The animal is represented as attached to a shell by suckers at the anterior end,—the broken parts of these organs are represented by dotted lines, as these appendages have been ruptured. In Prof. Hyatt's notes, brown matter is mentioned as being found at the place of adhesion of these suckers to the foreign body.

For a short portion of the body adjoining the terminal tentacles its surface is thrown into folds or ridges (*f*), which are possibly due to mural contraction. From this region there arise botryoidal bodies, which are supposed to be gonophores (*g*) or homologous structures, each of which has, according to the notes, a dark purple interior and a granular whitish exterior wall. The remainder of the body narrows gradually to its so-called posterior end, throughout which it is covered with closely crowded, wen-like structures of a light pink color. The interior of this region of the body is dark purple, and there is, according to the notes, a terminal orifice (*a*).

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[7] Stimpson's figures of Acaulis are the only ones yet published of this highly exceptional hydroid.

It will be noticed in reviewing Stimpson's account, and comparing his figures with those here published, that he also describes two successive stages of development which correspond closely with those which I have figured. The "tentacula" in the anterior region of one of those given are larger at the blunt extremity of the body, while the gonophores are in an advanced stage of development. In this stage of growth, organs which are called the "inferior appendages" by Stimpson had disappeared. The stage last mentioned is supposed to be the adult, or at all events to be older than the other form which he figures. By comparing it with the adult of Myriothela, as figured by Hincks and Allman, this conclusion seems to be tenable.

If now we turn to the two similar stages shown in the figures, which we here have given, it will be found that the older (Fig. 1), differs from the younger in the same way that the "adult" in those by Stimpson differs from what he considers the young. Possibly the most important difference in each case between the two stages is the loss, in the adult, of the temporary tentacles found in the young.

There have been several opinions expressed as to the relationships of the Acaulis. It has been called a free-swimming hydroid, and associated with the supposed free hydroid of Nemopsis,[8] mentioned by McCrady. It has also been likened to a head of a Tubularian ruptured from a hydroid stem. The true affinities have been conjectured by several naturalists, but so little has been made known of the anatomy of Acaulis that it has been difficult to compare it with other hydroids.

Hincks,[9] in discussing the relationship of Acaulis and Myriothela, says "Mr. Alder has suggested the probability of a close affinity between Myriothela and the Acaulis of Stimpson, and

[8] The young of Nemopsis has been shown to have a fixed hydroid.

[9] A History of British Hydroids, pp. 76, 77.

would place it in the family of the Tubularidæ. To this view I am unable to assent, although it has received a certain measure of support from Prof. Allman. The Acaulis is furnished at first with a verticil of filiform tentacles near the base of the polypite (though

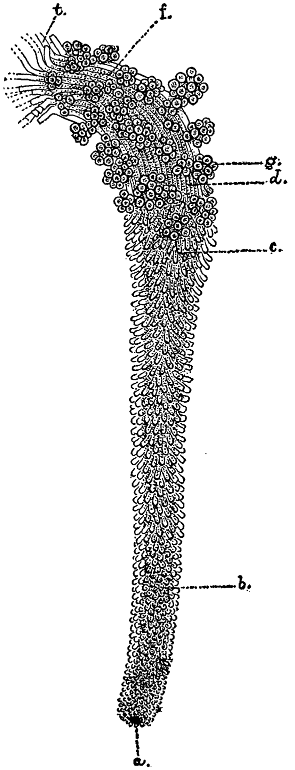

FIG. 1.—Adult Acaulis. *a*, terminal opening of the body—the interior of this body is " dark reddish purple " ; *b*, central, purple-colored body wall ; *e*, small papillæ—these, as well as the external body wall, are light pink ; *d*, ridges or folds in the external walls of the body, of a " white color " ; *e*, terminal continuation (unattached) of the body of the young Acaulis. *g*, gonophores—the interior of these clusters is dark purple ; the exterior, white granular ; *t*, permanent tentacles—" suctorial tentacles " ; *tt*, temporary tentacles.

they are said to disappear subsequently), and between these and the upper capitate tentacles the reproductive buds are developed on the body. But Myriothela, so far as we know, is destitute of basal tentacles at all stages of its existence, and the gonophores, instead of being borne on simple or branched pedicles, as in the Tubularidæ, are produced on distinct coryniform zooids—small, rudimentary polypites, which are homologous with the so-called gonoblastidia of Hydractinia or Dicoryne. It is, as I have said before, a cluster of polypites nearly related to Coryne; but its marked peculiarities would seem to entitle it to stand as the type of a special family."

The author would here offer the following generalization to which he has been led by the consideration of two facts exhibited in the characters of the animal above described. First, the basal cirri of the first stage are homologous to the lower or exterior tentacula of Tubularia. Secondly, these cirri, or tentacula, are lost [10] with the growth of the animal, and do not appear in the second stage. Hence we should consider the Tubularidæ, in which they are persistent, as lower in the scale. It might add some weight to this conclusion to call attention to the fact that the medusæ of Tubularia assume the form of Actinulæ, in which we have a remote resemblance to the young Acaulis.

It may be deduced, also, from the above account that the species just described, having basal tentacula, is more embryonic than Coryne and its allies, in which they never appear, so that it is correctly classed between that genus and Tubularia; and if, as is possible, the single circle of tentacula in the Sertularidæ is homologous with the basal tentacula of Acaulis and Tubularia, it would follow that that family should stand lower in an ascending scale of classification. The disappearance of the verticil of filiform tentacles in Acaulis is certainly not an objection to considering this genus as allied to Myriothela, especially since the account which Allman gives of the embryology of Myriothela, published subsequently to Hincks's "History of British Hydroids," shows that Myriothela has these or similar tentacles.[11]

[10] In regard to Hincks' dissent from Prof. Allman's opinion in regard to the affinities of Myriothela, and the grounds of his objection, it is only necessary to refer to Allman's Embryology of Myriothela, which to my mind effectually answers all objections as far as the supposed want of "basal tentacles at all stages of existence" goes. I believe, however, with Hincks, that Myriothela has such marked peculiarities that they "seem to entitle it to stand as a type for a special family."

[11] Probably absorbed, not deciduous.

It seems possible to take another view of the homology of the temporary or embryonic tentacles in the former stage of Acaulis than that suggested above. In the first place, we may regard them as the same as the temporary tentacles of the young Myriothela. They are in point of fact not unlike similar appendages in Actinula, with which they may be readily homologized. Somewhat similar temporary appendages appear in the young Glossocodon on the side of the bell, as have been described by others, and as I have figured in my paper on the Tortugas Acalephæ. If we regard the Actinula as represented by the young Glossocodon it seems possible that the temporary appendages in both may be homologous. It seems to me probable that there is a close likeness between the young Myriothela, as represented by Allman, and an Actinula in the smaller of the two kinds of specimens which are here figured.

It is on account of the embryonic likeness of Myriothela that in my plates of the Hydrozoa in the Embryological Monographs (Memoirs Museum Comp. Zoology, Vol. IX., No. 3.) I placed Myriothela in close proximity with Hydra among the lowest forms of these animals. Still, in certain features, Myriothela has a high organization which is shared also by Acaulis. It would be interesting and valuable from a morphological standpoint to know more of the ultimate form of the body and appendages of Acaulis, and some of the early stages in growth which lie between the ovum and the young with temporary tentacles.